**STATE OF IOWA**

**BEFORE THE IOWA UTILITIES BOARD**

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| **IN RE:**<br><br>**INTERSTATE POWER AND LIGHT COMPANY** | **DOCKET NO. RPU-2021-____** |

**DIRECT TESTIMONY OF BRENT R. KITCHEN**

**Q. Please state your name and your business address.**

A. My name is Brent R. Kitchen. My business address is 8000 Chavenelle Road, Dubuque, Iowa 52002.

**Q. By whom are you presently employed and in what capacity?**

A. I am employed by Alliant Energy Corporate Services, Inc. (AECS), a service company subsidiary of Alliant Energy Corporation (Alliant Energy). My job title is Manager Resource Planning. In this position, most of my time is spent working for Alliant Energy's wholly-owned utility subsidiaries, Interstate Power and Light Company (IPL), and Wisconsin Power and Light Company (WPL). I am testifying on behalf of IPL in this proceeding.

**Q. What is your educational background?**

A. I earned a Bachelor of Science Degree in Computer Science, with a minor degree in Mathematics from Loras College in 1985. I have also taken courses relating to energy risk management, electric market price volatility, and valuing real options.

**Q. Please describe your professional experience.**

A. I have over 36 years of utility experience, beginning with Interstate Power Company (IPC), an electric and gas public utility operating in Iowa, Illinois, and Minnesota and a predecessor of Alliant Energy. My experience history includes serving as Manager, Resource Planning, AECS, from 2011-present; Team Lead, Asset Strategy, AECS, from 2008-2011; Corporate Asset Management Consultant, AECS, from 1998-2008; Forecast/Planning Analyst, IPC, from 1987-1998; and Programmer Analyst, IPC, from 1985-1987. During my time working in the resource planning area, I have been involved with various Midcontinent Independent System Operator (MISO) stakeholder subcommittees, including the Supply Adequacy Working Group / Resource Adequacy Subcommittee and the Loss of Load and Expectation Working Group. In the past, I was active in the Electric Generation Expansion Analysis System (EGEAS) User's Group for decades. Recently, Alliant Energy transitioned to the Aurora resource planning software, with the assistance of Charles River Associates (CRA).

**Q. Have you provided testimony in prior regulatory proceedings before the Iowa Utilities Board (Board) and other regulatory agencies?**

A. Yes, I have provided testimony in several previous proceedings before the Board, the Public Service Commission of Wisconsin, and the Minnesota Public Utilities Commission. I most recently testified before the Board on behalf of IPL in Docket No. EPB-2020-0150, IPL's multi-year electric emissions plan and budget application.

**Q. What is the purpose of your testimony in this proceeding?**

A. The purpose of my testimony is to describe how IPL's recently concluded resource planning process supports the reasonableness of IPL's planned addition of up to 400 MW of solar generation. My testimony also supports the reasonableness of IPL's decision to take advantage of a unique opportunity to pair a 75 MW battery energy storage system (BESS) with a portion of the 400 MW of solar generation. Together, the 400 MW of solar generation facilities and 75 MW BESS are referred to as the Projects in my testimony.

**Q. Please provide an overview of your testimony.**

A. My testimony describes the Iowa Clean Energy Blueprint resource planning analysis that IPL conducted in collaboration with Iowa stakeholders during the calendar year 2020, consistent with the settlement of IPL's last electric rate case proceeding in Docket No. RPU-2019-0001. Public and confidential versions of the Clean Energy Blueprint were filed in Docket No. RPU-2019-0001 on November 20, 2020. With supplemental analysis performed since it was filed, the Clean Energy Blueprint supports IPL's decision to acquire up to 400 MW of solar capacity and a 75 MW BESS storage to be placed in service in 2023 and 2024, which will replace retiring coal capacity, enhance reliability, and take advantage of the investment tax credit (ITC), and provide long-term cost benefits to customers.

**Q. Are you sponsoring any exhibits in support of your testimony?**

A. Yes. I am sponsoring the following IPL Kitchen Direct Exhibit(s):

- Confidential Exhibit 1: IPL's Iowa Clean Energy Blueprint: 2020 Resource Planning Analysis; and
- Confidential Exhibit 2: Reliability Analysis: An Evaluation of the Expected Reliability of Midwest ISO Load Resource Zones 2 and 3, Astrapé Consulting.

## IPL'S CLEAN ENERGY BLUEPRINT

**Q. What recent steps has IPL taken to determine the future energy and capacity needs of its customers?**

A. Consistent with the Non-Unanimous Partial Settlement Agreement reached in Docket No. RPU-2019-0001 (the 2019 Electric Rate Case Settlement), the Iowa Clean Energy Blueprint resource planning analysis provides a detailed summary of the process IPL undertook, in collaboration with intervenors in IPL's last rate case, to model:

- existing supply resources in the Midcontinent Independent System Operator (MISO) Zone 3;
- potential future scenarios and pathways for IPL's existing generation resources; and
- portfolios to assess a variety of generation options across a range of planning metrics, including a full portfolio cost and financial analysis.

The key conclusions of the analysis are summarized in the final report found in IPL Kitchen Direct Confidential Exhibit 1.

**Q. Please provide a brief overview of IPL's Clean Energy Blueprint.**

A. IPL initiated the resource planning process in early 2020 and carried out the analysis in a phased fashion throughout the remainder of that year, engaging with stakeholders, seeking their input, and incorporating their diverse viewpoints along the way for a robust analysis. This collaboration was undertaken at a pace and framework aligned with our commitments in the 2019 Electric Rate Case Settlement.

**Q. Did stakeholders participate in IPL's Clean Energy Blueprint process?**

A. Yes. The following stakeholders were invited or participated in the Clean Energy Blueprint process: staff from the Board, the Office of Consumer Advocate, a division of the Iowa Department of Justice (OCA), the Environmental Law and Policy Center (ELPC), Iowa Environmental Council (IEC), the International Brotherhood of Electrical Workers, Local 204 (IBEW Local 204), Iowa Business Energy Coalition (IBEC), the Large Energy Group (LEG), Large General Service Group (LGSG), Sierra Club (SC), Decorah Area Group, ITC Midwest, and Walmart Stores, Inc. (Walmart).

Throughout the Clean Energy Blueprint process, IPL held six meetings with stakeholders for the purpose of informing and collaborating with them on the market planning scenarios, operational pathways for consideration, new resource options, and key input assumptions and output results. In addition, IPL engaged in a collaborative resource sharing effort wherein IPL provided written responses and supporting information and data to help address stakeholder questions and held several meetings with

individual stakeholders. IPL also supplied this information confidentially to the Board and stakeholders in Docket No. RPU-2019-0001.

**Q. Please describe how IPL developed its Clean Energy Blueprint.**

A. IPL partnered with CRA to develop an enhanced resource planning process using state-of-the-art tools and techniques to measure and evaluate future portfolio alternatives against a range of planning metrics. CRA is a consulting firm engaged in management consulting and expert support to clients worldwide. CRA's Energy Practice was formed in the late 1980s with much of the initial focus on electricity and gas markets development. Since that time, CRA has expanded into strategy, planning, and transaction support, primarily for electric utilities and other energy companies. One of CRA's major service areas for the last twenty years has been electric utility resource planning and strategy. Over the last two years, in addition to CRA's work with IPL, the firm has provided analysis and consulting support for the following MISO utilities: WPL, Northern Indiana Public Service Company, Great River Energy, Hoosier Energy, Minnkota Power Cooperative, and DTE Energy.

**Q. How did IPL and CRA determine IPL's customers' future capacity and energy needs for resource planning purposes?**

A. IPL and CRA conducted the resource planning for the Clean Energy Blueprint according to a scenario development process and portfolio and risk analysis to develop IPL-specific options and develop specific resource planning recommendations.

**Q. Please describe the scenario development process.**

A. The purpose of scenario development was to identify major external uncertainties against which to evaluate IPL's alternatives. This involved identifying major inputs and performing market simulations. As a first step, IPL and CRA formulated assumptions around an initial reference case set of market drivers, called the "Continuing Industry Change" scenario. These market drivers relied heavily on Wood Mackenzie commodity price and technology cost forecasts, supplemented by CRA's MISO market model in Aurora. In addition to this scenario, CRA and IPL also developed four alternative scenario concepts, each attempting to evaluate a series of risks relevant to the Iowa Clean Energy Blueprint process. After defining the scenario concepts, IPL and CRA worked to translate the scenario themes into specific assumptions for the key inputs of load, carbon price, natural gas price, coal price, and capital costs for new resource options.

**Q. Did IPL perform any scenarios at stakeholder direction?**

A. Yes. Stakeholders requested and developed their own scenarios and portfolios which IPL ran and which defined a wider set of scenario and portfolio considerations.[1] Four additional scenario concepts were developed by stakeholders, which generally modified one of the five existing scenario narratives (e.g. lower gas price, higher carbon price, higher or lower transmission interconnection costs, etc.).

[1] IPL performed these stakeholder runs in accordance with the terms of the Settlement Agreement. However, Article IX.C of the Settlement Agreement provides, in part, "IPL's agreement to conduct these runs does not constitute endorsement by IPL of these modeling run inputs or outputs."

**Q. Please describe the portfolio and risk analysis that was performed as part of the Iowa Clean Energy Blueprint.**

A. In preparing the portfolio and risk analysis, CRA implemented a two-phased modeling approach. Under Phase 1, CRA evaluated IPL's existing owned and operated generation fleet options to develop a series of generation portfolios that were evaluated under the scenarios described above. In Phase 2, CRA performed refinements on a short-list of candidate portfolios. Both stages of analysis evaluated portfolio options across the range of scenarios developed by IPL and stakeholders.

**Q. Please describe Phase 1 of the Portfolio and Risk Analysis.**

A. As part of Phase 1, IPL developed a set of nine feasible operational pathways for IPL's generating fleet. CRA constructed full portfolios under each of these operational pathways using the portfolio optimization feature in the Aurora resource planning model, including a range of new resource options against IPL's peak requirements and other modeling constraints. Specifically, IPL and CRA defined distinct retirement dates for several IPL-owned and operated thermal generating units, with associated expenditure estimates at the plant, and then performed a least cost optimization in the Aurora model to identify potential replacement resources.

**Q. What did the Phase 1 optimization show?**

A. Among other conclusions, across all operational pathways and all scenarios, utility scale solar was the predominant resource selected for IPL's capacity needs.

**Q. Please describe Phase 2 of the Portfolio and Risk Analysis element.**

A. In Phase 2, CRA constructed refined portfolios for further evaluation, including retirement in Lansing Unit 4 in 2022, rather than 2021, based on recent developments in environmental regulatory requirements; increased capacity from the Burlington Generating Station; and addition of up to 400 MW of solar prior to end of 2023. IPL evaluated nine portfolios in Phase 2 with these modified assumptions.

**Q. What were the results of the Phase 2 modeling?**

A. Among other findings, Phase 2 modeling showed that adding 400 MW of solar in 2023, combined with coal retirements and gas conversions, results in a portfolio with a lowest overall average long-term NPVRR, provides rate stability, maintains reliability and resource diversity, and achieves key sustainability metrics through reduced carbon and water use.

**Q. Does the modeling and financial analysis of portfolios in the Iowa Clean Energy Blueprint assume tax equity financing and efficient use of the ITC to reduce the overall capital cost of solar and storage?**

A. Yes. All new renewable additions are assumed to be tax-equity financed, and therefore the Iowa Clean Energy Blueprint analysis incorporates a reduction in upfront capital costs that would be required by IPL, which is effectively a discount offered by the tax equity partner in exchange for an allocation of the tax credits and accelerated depreciation benefits. This general approach is consistent with tax equity partnerships pursued by other investor-owned utilities in recent years.

## REASONABLENESS OF THE PROJECTS

**Q. Is IPL planning to acquire any solar and energy storage projects to help meet its customers' energy and capacity needs?**

A. Yes. IPL is proposing to acquire, construct, own, and operate 400 MW of solar electric generating facilities and a 75 MW BESS located in Iowa. Specifically, IPL is proposing to acquire two projects from NextEra Energy Resources, LLC (NextEra) that will be located near the Duane Arnold Energy Center in Linn County, Iowa: Duane Arnold Solar I (50 MW) and Duane Arnold Solar II, which includes 150 MW of solar generation and a 75 MW BESS (Duane Arnold Solar I and Duane Arnold Solar II, collectively, the Duane Arnold Solar Projects). IPL also plans to acquire, construct, own, and operate 200 MW of solar electric generating facilities to be sited in Iowa and constructed in accordance with advance ratemaking principles ordered by the Board in this proceeding. These projects may include those that IPL is developing in Iowa, or one or more projects that IPL may acquire from third-party developers.

**Q. Are the Projects a reasonable resource addition?**

A. Yes. The Iowa Clean Energy Blueprint shows that the benefits of acquiring 400 MW of solar PV facilities, compared to other resource alternatives, are significant. The Aurora resource planning model overwhelmingly selects solar PV over other resource options across all portfolios and all scenarios in both Phase 1 and 2 of the analysis. The solar generation facilities as part of the Projects are expected to produce significant benefits compared to

other resource alternatives and are the most cost-effective resource replacements for retiring coal-fired generation.

**Q. Did IPL consider entering into power purchase agreements (PPAs) for the Projects rather than acquiring them?**

A. Yes, but that option was rejected in light of the benefits of long-term ownership of projects for IPL's customers. These long-term benefits include an option to repower the Projects when equipment reaches the end of its useful life by taking advantage of the existing GIA for each Project, as well as the substation, roads, land rights, and siting studies, all of which will have already been fully paid for as part of the transactions with the developers. Relatedly, with long-term utility ownership, IPL may be able to continue operating the Projects, offering low-cost capacity and energy after the Projects have been fully depreciated. In addition, by owning the Projects (as opposed to acquiring PPAs), IPL will have the ability to take advantage of future technological developments and cost reductions expected during the life of the Project, including in the event of a repowering of the facilities that would enable lower cost, more efficient solar panels. And, IPL will have acquired interconnection rights, including surplus interconnection, for each Project that will allow IPL to augment the generation and output from the facilities for the benefit of its customers. In addition, it is my understanding that long-term ownership also supports IPL's financial health compared to PPA's, which can be treated as debt-like equivalents in a credit evaluation.

**Q. How do the Projects affect IPL's fuel diversity?**

A. The Projects, combined with IPL's 1,300 MW of utility-owned wind and over 500 MW of renewable power purchase agreements, are expected to bring IPL's total renewable energy portfolio to nearly 50 percent of IPL's total nameplate capacity beginning in 2025, and are an important part of Alliant Energy's goal to achieve net-zero carbon emissions by 2050. Combined with coal retirements and IPL's recent additions of wind, IPL is expected to be much less reliant on fossil fuels in the future, which will reduce fuel costs and emissions compared to today's levels.

**Q. In addition to the Iowa Clean Energy Blueprint, are there other reasons why the Projects would be a reasonable resource addition for IPL's customers?**

A. Yes. IPL's need for capacity is also supported by several uncertainties in MISO Zone 3, including tightening capacity markets and potential cost impacts for IPL's customers, changing MISO Resource Adequacy rules, potential retirement of other fossil generating units in MISO Zone 3, and policy changes toward increased decarbonization. The Projects provide a hedge against these uncertainties, benefitting customers with low-cost, zero-carbon energy and capacity and providing IPL with the ability to quickly adapt to an increasingly dynamic regulatory environment and market.

## ADDITIONAL ANALYSIS SUPPORTING THE BESS

**Q. Has IPL performed additional reliability analysis since completion of the Clean Energy Blueprint in 2020?**

A. Yes. IPL first utilized Astrapé Consulting to perform a Loss of Load

Expectation (LOLE) reliability analysis on renewable growth and storage impacts, with an emphasis on MISO Zone 3 (Iowa), which analyzes whether the BESS can play a significant role in enhancing IPL's reliability. Second, IPL reviewed MISO's proposed seasonal construct under the Resource Availability and Need (RAN) initiative to understand how resource adequacy requirements may evolve in the future, and whether the BESS can play a role in IPL's efforts to meet those resource adequacy requirements. Third, IPL created an indicative new supply-side resource comparison of IPL's available resource options to meet load requirements, which objectively compares the BESS to those other resource options.

## Astrapé Reliability Analysis

**Q. Who is Astrapé Consulting?**

A. Astrapé Consulting performs electric system planning services and resource adequacy studies. Astrapé uses the SERVM software for resource adequacy studies, capacity planning assessments, energy limited resource analyses, renewable integration studies, etc. This SERVM software is the same tool used by MISO to analyze LOLE to arrive at Planning Reserve Margin Requirements.

**Q. What analysis did Astrapé Consulting perform?**

A. IPL engaged Astrapé Consulting to review Alliant Energy's 2025 reliability using LOLE modeling with the SERVM software.

**Q. What are the findings from the Astrapé Consulting LOLE modeling?**

A. The Astrapé Consulting LOLE modeling report is provided as IPL Kitchen Confidential Exhibit 2. In sum, Astrapé concluded that MISO Zone 3 (Iowa) is expected to exceed the current MISO Planning Reserve Margin Requirement of 9.4 percent in 2025 and that MISO Zone 3 (Iowa) would need external support during some hours to achieve a 0.10 LOLE (1 day in 10-year target) in 2025. Specifically, Astrapé found that a maximum external support of 480 MW would be needed in some hours of the year, meaning that Iowa is expected to be dependent on the whole MISO footprint to meet resource adequacy during times of system stress. Astrapé also found that the required Planning Reserve Margin Requirement to achieve a zonally islanded 0.10 LOLE reliability would exceed MISO's current 9.4 percent footprint Planning Reserve Margin Requirement in 2025.

**Q. How can a BESS help mitigate LOLE risk?**

A. MISO accredited capacity for near-term battery energy storage installation is expected to be near 100 percent. With increasing renewables, peak LOLE risk is shifted to later in the day with high renewable penetration. Specifically, Astrapé found that peak risk shifts to between 5 pm and 8 pm in the summer months as the sun sets and wind tends to reduce. A dispatchable BESS would help better meet the peak load as it shifts to later in the day with high solar penetration, and also support higher capacity accreditation rates when combined with wind and solar generation.

**Q. Is IPL required to satisfy the zonally islanded targets in the reliability analysis?**

A. No. MISO resource adequacy requirements consider the benefit of the jointly operated footprint where individual Planning Resource Zones support each other as part of a power pool. Reviewing the Astrapé results, however, demonstrates that without a BESS IPL would be at greater risk of being dependent on other MISO zones, with attendant price volatility and uncertainty, in order to maintain reliability. A dispatchable BESS like the one proposed in this proceeding, paired with Duane Arnold Solar II, mitigates these risks and is key component of MISO's shift from fossil generation to increased renewable deployments.

## MISO Resource Availability and Need Initiative

**Q. What is the MISO Resource Availability and Need initiative?**

A. MISO's Resource Availability and Need (RAN) initiative is an evaluation of risks and issues impacting the availability of resources to sufficiently serve load and provide needed reserves at all hours of the year, as well as an evaluation of solutions to that reliability need. This effort is in response to significant renewable development and retirement of traditional resources such as coal and nuclear.[2]

**Q. How will the RAN initiative impact IPL's long-term resource adequacy requirements?**

A. MISO's resource adequacy requirements will evolve to ensure available capacity and reserves to cover all hours of the year. RAN solutions are

[2] MISO's issue tracking details for the RAN initiative can be found here: https://www.misoenergy.org/stakeholder-engagement/issue-tracking/resource-availability-and-need-ran/.

leading to seasonal capacity requirements and seasonal accreditation rates in the Planning Resource Auction. This is a change from historical reliability requirements which were largely limited to summer peak. MISO's resource adequacy requirements are also changing so that accreditation rates will be impacted by resource availability during tight margin hours. Tight margin hours occur when there are little to no excess resources available to reliably meet load plus a reserve margin.

**Q. How will IPL's generation portfolio need to evolve to satisfy future resource adequacy requirements?**

A. IPL will need a portfolio that can reliably cover tight margin hours across the seasons and year, and not just at summer peak, particularly in light of the impact of extreme winter weather events like the recent February 2021 polar vortex. And, MISO's availability metrics will require dispatchable resources that can complement renewable resources during hours of low renewable performance. A dispatchable BESS can help satisfy these requirements.

**Indicative New Supply-Side Resource Comparison**

**Q. Has IPL performed a resource comparison relative to evolving reliability needs?**

A. Yes, the Iowa Clean Energy Blueprint resource planning analysis (Aurora analysis) provides a comparison of alternatives, but IPL has also developed a table to illustrate how various resources meet IPL's reliability needs, provided below:

**Table 1. Indicative New Supply-Side Resource Comparison**

| Resource technology / fuel type | Accredited capacity (% of nameplate) | Energy capacity factor | Transmission interconnection cost risk | Congestion risk | Low to no carbon emissions | Dispatchable or performs at summer peak | Dispatchable or performs during tight margin hours across all seasons | Fuel supply risks |
|---|---|---|---|---|---|---|---|---|
| **Battery storage at DAS site** | 95% | n/a | Low | Low | Yes | Yes | Yes | None |
| **Solar at DAS site** | 50% | 24% | Low | Low | Yes | Yes | No | None |
| **Generic battery storage** | 95% | n/a | Medium unless relying on existing TM rights | Low | Yes | Yes | Yes | None |
| **Generic solar** | 50% | 24% | Medium unless relying on existing TM rights | Low | Yes | Yes | No | None |
| **Wind** | 15% | 40% | High unless relying on existing TM rights | High | Yes | No | No | None |
| **Natural gas peaker** | 95% | Low | Medium unless relying on existing TM rights | Low | No | Yes | Yes | Varies |
| **Natural gas combined cycle** | 95% | Up to 90% | High unless relying on existing TM rights | Low | No | Yes | Yes | Varies |

**Q. What are the key findings from this comparison table?**

A. No one particular resource can cost-effectively cover all of IPL's reliability needs without risks. Instead, IPL relies on a diverse portfolio to cover reliability needs. A BESS paired with solar complements renewables as a dispatchable resource without fuel costs or emissions relative to traditional fossil fuel fired resources. Further, a BESS paired with solar at Duane Arnold Solar II represents a unique commercial opportunity to IPL that is expected to have modest transmission network upgrade costs due to the

replacement generation process resulting from the 2020 retirement of the Duane Arnold Energy Center, a nuclear generating facility.

**Q. Please summarize how the BESS at Duane Arnold Solar II is a reasonable, cost-effective resource addition for IPL's customers.**

A. Based on evolving reliability needs, technology and fuel diversity, storage project costs, expiring ITCs, and anticipated lack of transmission network upgrade costs, the BESS at Duane Arnold Solar II is a reasonable and cost-effective resource addition for IPL's customers. Significantly, the Astrapé Consulting reliability analysis points to the risks of Iowa's reliance on the MISO footprint to maintain local reliability. A utility scale BESS with a high capacity accreditation rate helps mitigate those risks and acts as a dispatchable complement to renewables. Further, the additional dispatchable capacity helps manage risks resulting from federal regulatory and market changes that are likely to continue to accelerate retirement for fossil-fuel fired units such as coal and combined cycle. Finally, IPL's acquisition of the BESS with Duane Arnold Solar II allows MISO and IPL to build operational knowledge over time in response to an evolving grid with significant renewable expansion and retirement of traditional resources in Iowa and MISO as a whole.

**Q. Does this conclude your direct testimony?**

A. Yes.

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AFFIDAVIT OF
BRENT R. KITCHEN

STATE OF IOWA )
) ss.
COUNTY OF DUBUQUE )

I, Brent R. Kitchen being first duly sworn on oath, depose and state that I am the same Brent R. Kitchen identified in the Direct Testimony; that I have caused the Direct Testimony, including exhibits, to be prepared and am familiar with the contents thereof; and that the Direct Testimony, including exhibits, are true and correct to the best of my knowledge and belief as of the date of this Affidavit.

*/s/ Brent R. Kitchen*
Brent R. Kitchen

Subscribed and sworn to before me,
a Notary Public in and for said County
and State, this 1st day of November, 2021.

*/s/ Renee A. Erschen*
Renee A. Erschen
Notary Public
My commission expires on October 2, 2023